

(2)

特開平8-235233

1

【特許請求の範囲】

【請求項1】 各端末それぞれにおけるCAD図面に対する編集操作を他の端末に通知する第一の通知手段と、前記第一の通知手段により該他の端末から通知された設計操作を受信する受信手段と、前記各端末毎に優先順位を設定する設定手段と、前記受信手段で受信し前記設定手段で設定した設計操作の優先順位を判断する判断手段と、前記判断手段で判断した優先順位に従って他端末の設計操作を自端末に反映させこの操作を行っていない他の端末に通知する第二の通知手段とから成るそれぞれ独立した複数のCAD端末と、これら複数のCAD端末間を繋ぐネットワークとから構成されることを特徴とする並行設計システム。

【請求項2】 オペレータが設計操作を入力するための外部入力装置1と、この操作に従って設計データを加工する操作実行部2と、前記加工された設計データを記憶する設計データ格納部3と、設計物の状態を表示する表示部4および表示装置5と、前記操作実行部2で行われた設計操作を外部に通知する実施操作通知部6と、同一の設計に参加する他のCADの実施した操作に関する通知情報を受信する操作受信部7と、他の端末に矛盾操作を通知する矛盾操作通知部8と、前記操作受信部7で受信した操作と前記設計データ格納部3に記憶された設計データとの矛盾を検出し優先順位の判断に従って受信した操作を優先させる場合には前記操作実行部2にこれを実行させ受信した操作を無視する場合には前記矛盾操作通知部8に操作が無視されたことを外部に通知させる操作間矛盾検出部9と、前記操作間矛盾検出部9で矛盾が生じた場合に受信した前記通知情報と現在の設計データのどちらを優先させるかを判断し前記操作間矛盾検出部9に優先順位を通知する並行設計管理部10とから成るそれぞれ独立した複数のCAD①、②、③、...と、これら複数のCAD①、②、③、...間を繋ぐネットワーク11とから構成されることを特徴とする並行設計システム。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、CAD（計算機援用設計）システムに関し、特に、全体を複数の設計者で並行して設計する並行設計システムに関する。

【0002】

【従来の技術】CADシステムにおける図面編集作業では、通常は1端末で1つの図面データベースを編集するのが一般的であったが、特開平4-362783号公報のような複数の端末を持ち、各端末のオペレータが同時に編集できるようなシステムも提案されている。

【0003】図3は従来の特開平4-362783号公報のシステムの一実施例のブロック図である。

【0004】同図において、端末31a、31bは、CAD画面の編集操作等に用いられる端末で、タスクマネ

2

ージャ32は、各端末31a、31bでのCAD図面編集結果を管理するためのものである。タスクマネージャ32は、例えばホスト装置（図示せず）の内に設けられる。CAD図面データベース（以下、CAD図面DBと称す）33は、CAD画面（CAD図面データ）を保存するためのものであり、作業用データベース（以下、作業用DBと称す）34は、CAD図面編集に用いられるものである。CAD図面DB33および作業用DB34はタスクマネージャ32によってアクセスされる。表示ハンドラ35a、35bは端末31a、31bに対するCAD図面などの表示を司るものであり、CADモジュール36a、36bはCAD図面編集アプリケーションプログラムによって実現されるCAD図面編集処理機能を持つものであり、入出力ハンドラ37a、37bはタスクマネージャ32と端末31a内のCADモジュール36aおよび端末31b内のCADモジュール36bとの間の入出力インタフェースをなすものである。入出力ハンドラ37a、37bは、端末31a、31bでのCAD図面編集結果をタスクマネージャ32に伝えると共に、タスクマネージャ32から渡される他端末でのCAD図面編集結果を対応するCADモジュール36a、36bに渡すようになっている。表示ハンドラ35a、35b、CADモジュール36a、36bおよび入出力ハンドラ37a、37bは、端末31a、31bに内蔵されている。

【0005】この方法によれば、複数の端末それぞれにおける同一のCAD図面に対する編集結果を管理して、各端末での編集結果により図面データベースを更新する管理手段を設けると共に、この管理手段から他端末での編集結果を受け取って対応する端末に通知する入出力手段とを設けた構成により、CAD編集時に同一図面を複数端末から同時並行して操作できるようになり、設計工期の短縮が図れる。

【0006】しかし、この方法には次に挙げる課題が残されている。

【0007】

【発明が解決しようとする課題】上述した従来のシステムでは、複数の設計者は、ある設計者の編集結果が他の設計者の設計の障害、例えば、プリント基板を設計する場合、ある設計者が配線をしようとしているスペースに他の設計者がねじのための穴をあけるなど、互いに矛盾のある編集操作を行う可能性がある。このように従来方法では設計端末を全て対等に扱っているために、矛盾する設計操作を受け入れてしまう。このため、設計者間で干渉がおり、ある設計者の設計目標を別の設計者が破壊したり、全体として編集作業の効率が低下したりする。

【0008】従来する方法を使用しながらこれを防ぐための方法として、設計者間に干渉が起きないようなルール（例えば、設計者毎に設計を担当する部分を定める等）

50

3

を設定することが考えられる。しかし、このようなルールでは設計物全体を並行設計するというメリットが損われてしまい、単なる分割設計と変わらなくなってしまうことがある。

【0009】

【課題を解決するための手段】本発明の並行設計システムは、各端末それぞれにおけるCAD図面に対する編集操作を他の端末に通知する第一の通知手段と、第一の通知手段により該他の端末から通知された設計操作を受信する受信手段と、各端末毎に優先順位を設定する設定手段と、受信手段で受信し設定手段で設定した設計操作の優先順位を判断する判断手段と、判断手段で判断した優先順位に従って他端末の設計操作を自端末に反映させるこの操作を行っていない他の端末に通知する第二の通知手段とから成るそれぞれ独立した複数のCAD端末と、これら複数のCAD端末間を繋ぐネットワークとから構成されることを特徴としている。

【0010】本発明の並行設計システムは、オペレータが設計操作を入力するための外部入力装置1と、この操作に従って設計データを加工する操作実行部2と、加工された設計データを記憶する設計データ格納部3と、設計物の状態を表示する表示部4および表示装置5と、操作実行部2で行われた設計操作を外部に通知する実施操作通知部6と、同一の設計に参加する他のCADの実施した操作に関する通知情報を受信する操作受信部7と、他の端末に矛盾操作を通知する矛盾操作通知部8と、操作受信部7で受信した操作と設計データ格納部3に記憶された設計データとの矛盾を検出し優先順位の判断に従って受信した操作を優先させる場合には操作実行部2にこれを実行させ受信した操作を無視する場合には矛盾操作通知部8に操作が無視されたことを外部に通知させる操作間矛盾検出部9と、操作間矛盾検出部9で矛盾が生じた場合に受信した通知情報と現在の設計データのどちらを優先させるかを判断し操作間矛盾検出部9に優先順位を通知する並行設計管理部10とから成るそれぞれ独立した複数のCAD①、②、③、...と、これら複数のCAD①、②、③、...間を繋ぐネットワーク11とから構成されることを特徴としている。

【0011】

【実施例】次に、本発明の実施例について図面を参照して説明する。

【0012】図1は本発明の並行設計システムの一実施例のブロック図である。

【0013】図1の場合は、CAD①、CAD②、CAD③が並行設計を行っている。これらの3つのCADは同じ構成であるが、並行設計管理部10の設定により、1台を優先順位の高い親CAD、他のCADをより優先順位の低い子CADとして登録する。ただし、このブロック図より詳細なレベルでは各CADが同一のものである必要はなく、たとえば、操作実行部等が設計分野に対

(3)

特開平8-235233

4

応した異種のCADが混在していてもよい。

【0014】外部入力装置1は、マウス、キーボード等のCAD設計操作を行う入力装置である。操作実行部2は、設計データ格納部3をアクセスし、設計操作を設計データに反映する。この端末が子CADである場合には、同時に並行設計管理部10に親CADを問い合わせ、実施操作通知部8、ネットワーク11を通して、親CADに行った設計操作を通知する。データ格納部3の内容はデータを表示する表示部4、ブラウン管等から成る表示装置5を通して表示される。

【0015】操作受信部7は、ネットワーク11から他端末からの通知を受信し、操作間矛盾検出部9に通知する。操作間矛盾検出部9は並行設計管理部10を参照し、操作の通知元端末と自端末の優先順位を比較する。更に、自端末のデータとの矛盾の有無を検出し、これに従って次のように動作する。

【0016】自端末が子CAD、通知元が親CADであれば、操作実行部2が設計データ格納部3のデータに対して通知された操作を行う。通知元が他の子CADであれば、通知内容を無視する。

【0017】自端末が親CADであれば、操作間矛盾検出部9は自端末の設計データ格納部3を参照し、設計目標との矛盾を検出する。ここで矛盾が検出されなければ操作は操作実行部2によって実行される。更に、実施操作通知部8を通してこの操作をまだ行っていない他のCADに通知する。この結果全CADでこの操作が行われる。操作間矛盾検出部9で矛盾が発見された場合は、矛盾操作通知部8を通して通知元の子CADへ通知する。この操作は無視され、設計データ格納部3にも反映しない。

【0018】親CADの矛盾操作通知部から通知を受けた子CADの操作間矛盾検出部9は、無条件で行った操作をキャンセルする命令を操作実行部2に出力し、設計データ格納部3にある設計データは操作前の状態に戻される。

【0019】上の動作の結果、各CADで行われる操作は次のように他のCADに伝えられる。親CADで行われた操作は全ての子CADでも実行される。子CADで行われた操作は、一度親CADで矛盾の有無を調べられた後、矛盾のないものは親CAD及び他の全ての子CADで実行される。矛盾があるものは実行した子CADにこの操作をキャンセルするよう親CADから通知され、子CADのデータは操作前の状態に戻される。

【0020】次に、上記の並行設計システムのより具体的なシステムの例について以下に説明する。

【0021】図2は図1の並行設計システムの具体的な構成の一例を示すシステム図である。

【0022】この並行設計システムは、CADシステム21と、CADデータ22と、キーボード23と、CAD画面24と、マウス25とから成るそれぞれ独立した

50

(4)

特開平8-235233

5

複数のCAD①、②、③、...と、これら複数のCAD①、②、③、...を接続するネットワーク26とから構成されている。

【0023】ここで、このCADシステム21が図1の操作実行部2、設計データ格納部3、表示部4および実施操作通知部6、操作受信部7、矛盾操作通知部8、操作間矛盾検出部9、並行設計管理部10に、CADデータ22が設計データ格納部3に、キーボード23が外部入力装置1に、CAD画面24が表示装置5に、ネットワーク26がネットワーク11に相当している。そして、他端末からの操作による通知情報がCADシステム21（図1の操作受信部7）で受信され、また、設計者がキーボード23、マウス25などを操作した情報が、CADシステム21（図1の実施操作通知部6、矛盾操作通知部8）から他端末を操作ための通知情報として送信される。

【0024】このようにして、この具体的な並行設計システムで上記図1で説明した一連の動作が行われる。

【0025】

【発明の効果】以上説明したように、本発明の並行設計システムは、子CADで行われた操作は全て親CADで矛盾をチェックされ、矛盾のないものだけが全CADに通知されるので、全てのCADで親CADの設計目標が達成されていることが保証され、また、各子CADの設計目標は親CADの操作と干渉する可能性があるが、各子CAD内でこれを解消し、目標を達成することにより、全体として全ての設計目標を達成することができ、この結果、本発明の並行設計システムは、各設計者が同時に多数の目標を考慮する必要がなくなり、目標間の干渉による設計効率の低下、設計ミスを防止することができるという効果を奏する。

【図面の簡単な説明】

*

5

*【図1】本発明の並行設計システムの一実施例のブロック図である。

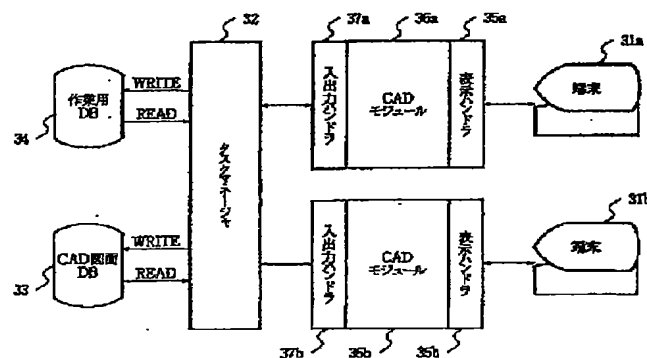
【図2】図1の並行設計システムの具体的な構成の一例を示すシステム図である。

【図3】従来の特開平4-362783号公報のシステムの一実施例のブロック図である。

【符号の説明】

- 1 外部入力装置
- 2 操作実行部
- 3 設計データ格納部
- 4 表示部
- 5 表示装置
- 6 実施操作通知部
- 7 操作受信部
- 8 矛盾操作通知部
- 9 操作間矛盾検出部
- 10 並行設計管理部
- 11 ネットワーク
- 21 CADシステム
- 22 CADデータ
- 23 キーボード
- 24 CAD画面
- 25 マウス
- 26 ネットワーク
- 31a, 31b 端末
- 32 タスクマネージャ
- 33 CAD図面DB
- 34 作業用DB
- 35a, 35b 表示ハンドラ
- 36a, 36b CADモジュール
- 37a, 37b 入出力ハンドラ

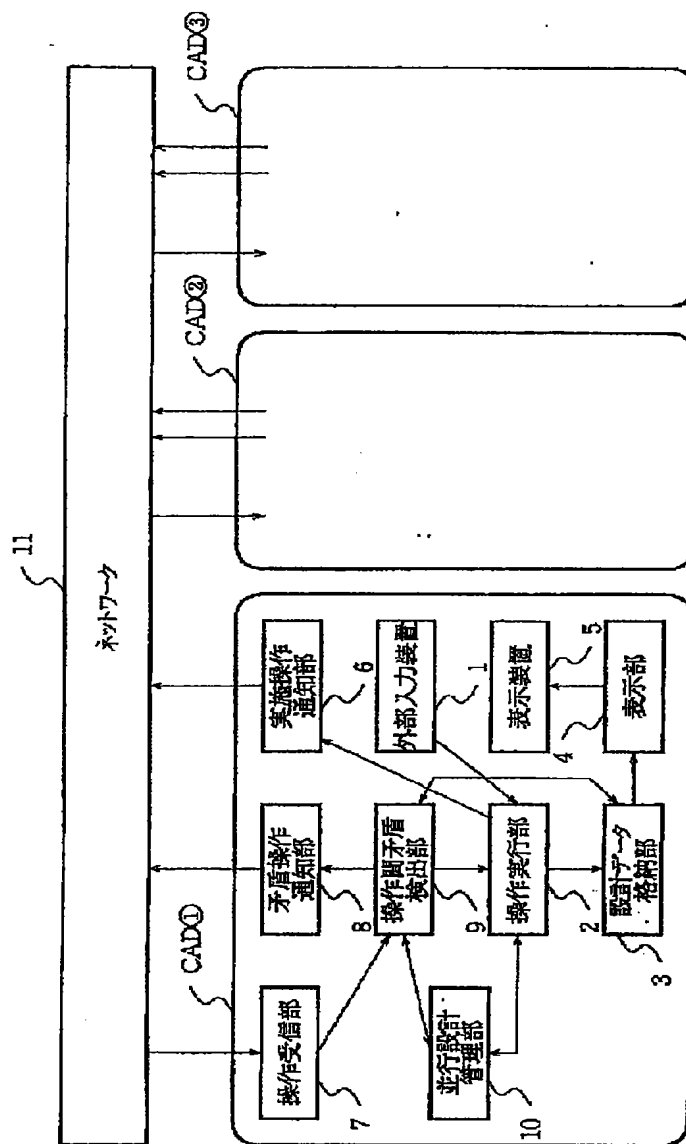
【図3】



(5)

特開平8-235233

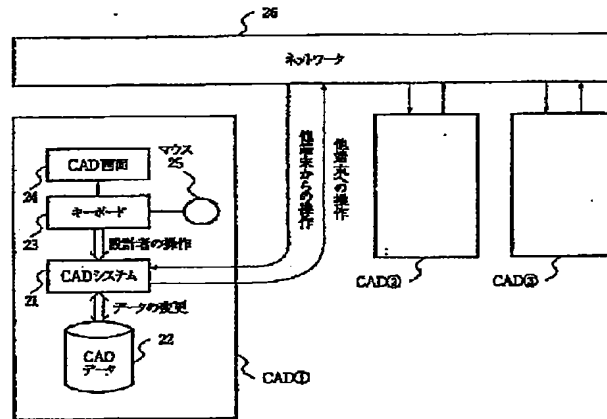
【図1】



(6)

特開平8-235233

【図2】



PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-235233

(43)Date of publication of application : 13.09.1996

(51)Int.Cl.

G06F 17/50

(21)Application number : 07-038249

(71)Applicant : NEC CORP

(22)Date of filing : 27.02.1995

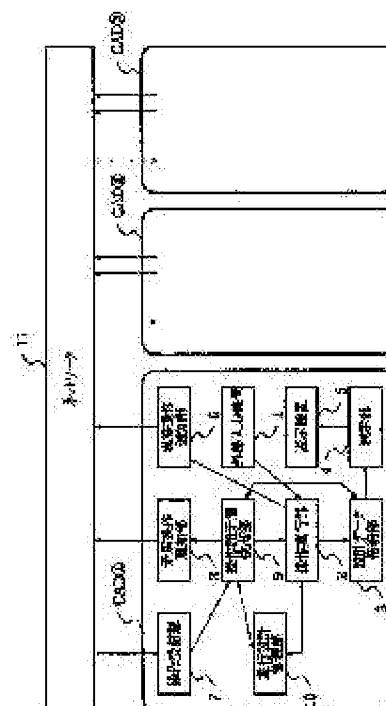
(72)Inventor : SHIBATA KAZUKI

(54) PARALLEL DESIGN SYSTEM

(57)Abstract:

PURPOSE: To improve the efficiency of design by parallelly editing a CAD drawing without dividing a screen from plural terminals and preventing the interference of design operations among the terminals at the time of editing.

CONSTITUTION: An external input device 1 performs the CAD design operation of a mouse and a keyboard, etc., and an operation execution part 2 accesses a design data storage part 3 and reflects the design operation on the design data. When the terminal is a slave CAD, a master CAD is inquired to a parallel design management part 10 simultaneously and the master CAD is informed of the performed design operation through an execution operation informing part 6 and a network 11. The contents of the data storage part 3 are displayed through a display part 4 for displaying data and a display device 5 composed of a cathode-ray tube or the like. An operation reception part 7 receives informing from the other terminals from the network 11 and informs an inter-operation discrepancy detection part 9. The inter-operation discrepancy detection part 9 refers to the parallel design management part 10, compares the priority of the informing origin terminal of the operation and its own terminal and detects the presence/absence of discrepancy with the data of its own terminal.



LEGAL STATUS

[Date of request for examination]	27.02.1995
[Date of sending the examiner's decision of rejection]	
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	2746174
[Date of registration]	13.02.1998
[Number of appeal against examiner's decision of rejection]	
[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	13.02.2002

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The first advice means which notifies the editing operation to the CAD drawing in each of each terminal to other terminals, A receiving means to receive the design actuation notified from other terminals of relevance by said first advice means, A setting-out means to set up priority for said every terminal, and a decision means to judge the priority of the design actuation which received with said receiving means and was set up with said setting-out means, Two or more CAD terminals which consist of second advice means to notify to other terminals which are made to reflect the design actuation in the end of the other end in the end of a local according to the priority judged with said decision means, and omit this actuation and which became independent, respectively, The concurrent-design system characterized by consisting of networks which connect between the CAD terminals of these plurality.

[Claim 2] External input equipment 1 for an operator to input design actuation and the actuation activation section 2 which processes a design data according to this actuation, The design data storage section 3 which memorizes said processed design data, and the display 4 and display 5 which display the condition of a design object, The advice section 6 of operation actuation which notifies outside the design actuation performed in said actuation activation section 2, With the actuation receive section 7 which receives the advice information about the actuation which other CAD which participates in the same design carried out The advice section 8 of conflict actuation which notifies conflict actuation to other terminals, The actuation received in said actuation receive section 7 Conflict with the design data memorized by said design data storage section 3 The actuation conflict detecting element 9 to which it is made to notify outside that actuation was disregarded by said advice section 8 of conflict actuation when the actuation which said actuation activation section 2 was made to perform this, and was received when priority was given to the actuation which was detected and was received according to decision of priority was disregarded, Two or more CAD**s, **, **, and ... which consist of the concurrent-design Management Department 10 which judges whether you make which of said advice information received when conflict arose in said actuation conflict detecting element 9, and a current design data give priority, and notifies priority to said actuation conflict detecting element 9 and which became independent, respectively, CAD** of these plurality, **, **, and ... the concurrent-design system characterized by consisting of networks 11 which connect between.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram of one example of the concurrent-design system of this invention.

[Drawing 2] It is the system chart showing an example of the concrete configuration of the concurrent-design system of drawing 1 .

[Drawing 3] It is the block diagram of one example of the system of conventional JP,4-362783,A.

[Description of Notations]

- 1 External Input Equipment
- 2 Actuation Activation Section
- 3 Design Data Storage Section
- 4 Display
- 5 Display
- 6 Advice Section of Operation Actuation
- 7 Actuation Receive Section
- 8 Advice Section of Conflict Actuation
- 9 Actuation Conflict Detecting Element
- 10 Concurrent-Design Management Department
- 11 Network
- 21 CAD System
- 22 CAD Data
- 23 Keyboard
- 24 CAD Screen
- 25 Mouse
- 26 Network
- 31a, 31b Terminal
- 32 Task Manager
- 33 CAD Drawing DB
- 34 Operating DB
- 35a, 35b Display handler
- 36a, 36b CAD module
- 37a, 37b I/O handler

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the concurrent-design system which designs the whole in parallel by two or more architects especially about a CAD (computer-aided design) system.

[0002]

[Description of the Prior Art] Although it was common in the drawing editing task in a CAD system to usually have edited one drawing database at one terminal, it has two or more terminals like JP,4-362783,A, and the system which the operator of each terminal can edit simultaneously is also proposed.

[0003] Drawing 3 is the block diagram of one example of the system of conventional JP,4-362783,A.

[0004] in this drawing, Terminals 31a and 31b are terminals used for the editing operation of a CAD screen etc., and a task manager 32 is ** for managing the CAD drawing edit result in each terminals 31a and 31b. A task manager 32 is formed in the inside of for example, host equipment (not shown). The CAD drawing database (the CAD drawing DB is called hereafter) 33 is for saving a CAD screen (CAD drawing data), and the operating database (Operating DB is called hereafter) 34 is used for CAD drawing edit. The CAD drawing DB33 and operating DB34 are accessed by the task manager 32. The display handlers 35a and 35b manage the display of the CAD drawing to Terminals 31a and 31b etc., the CAD modules 36a and 36b have the CAD drawing edit processing facility realized by the CAD drawing edit application program, and the I/O handlers 37a and 37b form the input/output interface between CAD module 36b in CAD module 36a in a task manager 32 and terminal 31a, and terminal 31b. The I/O handlers 37a and 37b pass the CAD drawing edit result in the end of the other end it is passed from a task manager 32 to the corresponding CAD modules 36a and 36b while telling the CAD drawing edit result in Terminals 31a and 31b to a task manager 32. The display handlers 35a and 35b, the CAD modules 36a and 36b, and the I/O handlers 37a and 37b are built in Terminals 31a and 31b.

[0005] According to this approach, the edit result of the same CAD drawing in two or more terminals of each manages, while forming the management tool which updates a drawing database by the edit result in each terminal, the concurrency of the same drawing carries out from two or more terminals at the time of CAD edit, it can operate now by the configuration which established an I/O means notify the edit result in the end of the other end to the terminal which receives and corresponds from this management tool, and compaction of a design construction period can plan.

[0006] However, the next technical problem is left behind to this approach.

[0007]

[Problem(s) to be Solved by the Invention] In the conventional system mentioned above, two or more architects may perform editing operation which has conflict mutually -- other architects make the hole for a screw thread in the tooth space to which a certain architect is going to wire -- when a certain architect's edit result designs the failure of a design of other architects, for example, a printed circuit board. Thus, by the conventional approach, since all design terminals are treated to the pair etc., consistent design actuation will be accepted. For this reason, interference starts among architects, another architect destroys a certain architect's design objective, or the effectiveness of an editing task

falls as a whole.

[0008] It is possible to set up a rule (for example, for the part which takes charge of a design for every architect to be decided) to which interference does not break out among architects as an approach for preventing this, using the conventional approach. However, with such a rule, the merit of carrying out the concurrent design of the whole design object will be spoiled, and it may not be different from a mere division design.

[0009]

[Means for Solving the Problem] First advice means by which the concurrent-design system of this invention notifies the editing operation to the CAD drawing in each of each terminal to other terminals, A receiving means to receive the design actuation notified from other terminals of relevance by the first advice means, A setting-out means to set up priority for every terminal, and a decision means to judge the priority of the design actuation which received with the receiving means and was set up with the setting-out means, Two or more CAD terminals which consist of second advice means to notify to other terminals which are made to reflect the design actuation in the end of the other end in the end of a local according to the priority judged with the decision means, and omit this actuation and which became independent, respectively, It is characterized by consisting of networks which connect between the CAD terminals of these plurality.

[0010] External input equipment 1 for an operator to input design actuation, as for the concurrent-design system of this invention, The actuation activation section 2 which processes a design data according to this actuation, and the design data storage section 3 which memorizes the processed design data, The display 4 and display 5 which display the condition of a design object, and the advice section 6 of operation actuation which notifies outside the design actuation performed in the actuation activation section 2, With the actuation receive section 7 which receives the advice information about the actuation which other CAD which participates in the same design carried out The advice section 8 of conflict actuation which notifies conflict actuation to other terminals, That actuation was disregarded by the advice section 8 of conflict actuation when ignoring the actuation made the actuation activation section 2 perform this, and received when priority was given to the actuation which detected conflict with the design data memorized by the actuation received in the actuation receive section 7, and the design data storage section 3, and was received according to decision of priority The actuation conflict detecting element 9 made to notify outside, Two or more CAD**s, **, **, and ... which consist of the concurrent-design Management Department 10 which judges whether you make which of the advice information received when conflict arose in the actuation conflict detecting element 9, and a current design data give priority, and notifies priority to the actuation conflict detecting element 9 and which became independent, respectively, CAD** of these plurality, **, **, and ... it is characterized by consisting of networks 11 which connect between.

[0011]

[Example] Next, the example of this invention is explained with reference to a drawing.

[0012] Drawing 1 is the block diagram of one example of the concurrent-design system of this invention.

[0013] In the case of drawing 1, CAD**, CAD**, and CAD** are performing the concurrent design. Although such three CAD is the same configurations, the parents CAD with priority high one set and other CAD are registered as a child CAD with more low priority by setting out of the concurrent-design Management Department 10. However, on level more detailed than this block diagram, each CAD does not need to be the same, for example, CAD of a different kind corresponding to the design field in the actuation activation section etc. may be intermingled.

[0014] External input equipment 1 is an input device which performs CAD design actuation of a mouse, a keyboard, etc. The actuation activation section 2 accesses the design data storage section 3, and reflects design actuation in a design data. When this terminal is Child CAD, Parents CAD are simultaneously asked to the concurrent-design Management Department 10, it lets the advice section 6 of operation actuation, and a network 11 pass, and the design actuation given to Parents CAD is notified. The content of the data storage section 3 is displayed through the display 5 which consists of the display

4 which displays data, the Braun tube, etc.

[0015] The actuation receive section 7 receives the advice from the end of the other end from a network 11, and notifies to the actuation conflict detecting element 9. The actuation conflict detecting element 9 compares the priority in the notifying agency terminal of actuation, and the end of a local with reference to the concurrent-design Management Department 10. Furthermore, the existence of conflict with the data in the end of a local is detected, and it operates as follows according to this.

[0016] If the end of a local is Child CAD and notifying agencies are Parents CAD, actuation in which the actuation activation section 2 was notified to the data of the design data storage section 3 will be performed. If notifying agencies are other children CAD, the content of advice will be disregarded.

[0017] If the end of a local is Parents CAD, the actuation conflict detecting element 9 will detect conflict with a design objective with reference to the design data storage section 3 in the end of a local.

Actuation is performed by the actuation activation section 2 if conflict is not detected here. Furthermore, the advice section 6 of operation actuation is notified to other CAD which has not operated the through lever yet. As a result, this actuation is performed by all CAD. When conflict is discovered by the actuation conflict detecting element 9, the child CAD of a notifying agency is notified through the advice section 8 of conflict actuation. This actuation is disregarded and is not reflected in the design data storage section 3.

[0018] The instruction which cancels the actuation to which the carrier beam child's CAD actuation conflict detecting element 9 carried out advice unconditionally from Parents' CAD advice section of conflict actuation is outputted to the actuation activation section 2, and the design data in the design data storage section 3 is returned to the condition before actuation.

[0019] The actuation performed by each CAD is told to other CAD as follows as a result of the upper actuation. As for the actuation performed by Parents CAD, all the children CAD are also performed. Once the actuation performed by Child CAD is able to investigate the existence of conflict by Parents CAD, the thing without conflict is performed by Parents CAD and all other children CAD. The child CAD who performed is informed of the thing with conflict that this actuation is canceled by Parents CAD, and Child's CAD data are returned to the condition before actuation.

[0020] Next, the example of the more concrete system of the above-mentioned concurrent-design system is explained below.

[0021] Drawing 2 is the system chart showing an example of the concrete configuration of the concurrent-design system of drawing 1.

[0022] This concurrent-design system consists of networks 26 which connect two or more CAD**s, **, ** and ... which consist of CAD system 21, the CAD data 22, a keyboard 23, the CAD screen 24, and a mouse 25, and which became independent, respectively, and CAD** of these plurality, **, ** and ...

[0023] here -- this CAD system 21 -- the actuation activation section 2 of drawing 1, the design data storage section 3, a display 4 and the advice section 6 of operation actuation, the actuation receive section 7, the advice section 8 of conflict actuation, the actuation conflict detecting element 9, and the concurrent-design Management Department 10 -- the CAD data 22 -- the design data storage section 3 -- the CAD screen 24 is equivalent to a display 5, and the network 26 is equivalent to external input equipment 1 for the keyboard 23 in the network 11. And the end of the other end is transmitted to the information to which the advice information by the actuation from the end of the other end was received by CAD system 21 (actuation receive section 7 of drawing 1), and the architect operated the keyboard 23, the mouse 25, etc. as advice information on an actuation sake from CAD system 21 (the advice section 6 of operation actuation of drawing 1, advice section 8 of conflict actuation).

[0024] Thus, a series of actuation explained by above-mentioned drawing 1 by this concrete concurrent-design system is performed.

[0025]

[Effect of the Invention] As explained above, the concurrent-design system of this invention Although it is guaranteed that Parents' CAD design objective is attained by all CAD and each child's CAD design objective may interfere with actuation of Parents CAD since only what all actuation performed by Child CAD has conflict checked by Parents CAD, and does not have conflict is notified to all CAD All design

objectives can be attained as a whole by canceling this within each child CAD and attaining a target. Consequently, the need of the concurrent-design system of this invention that each architect takes many targets into consideration simultaneously is lost, and it does so the effectiveness that decline in the design effectiveness by interference between targets and a design mistake can be prevented.

[Translation done.]

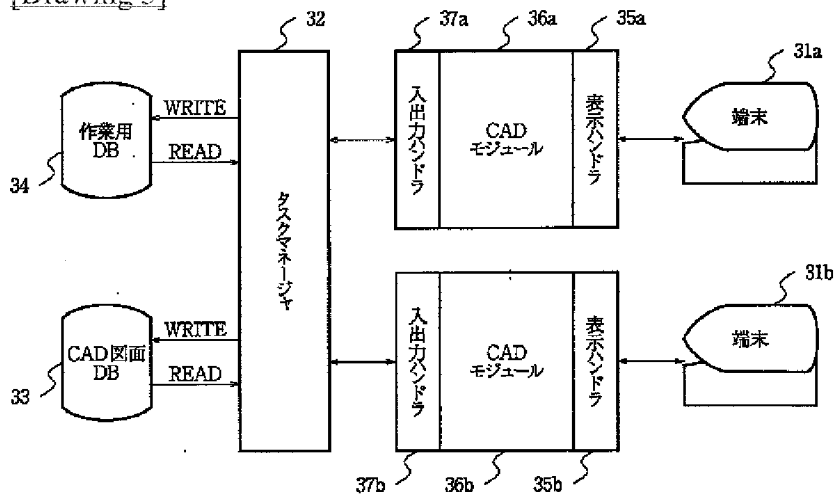
* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

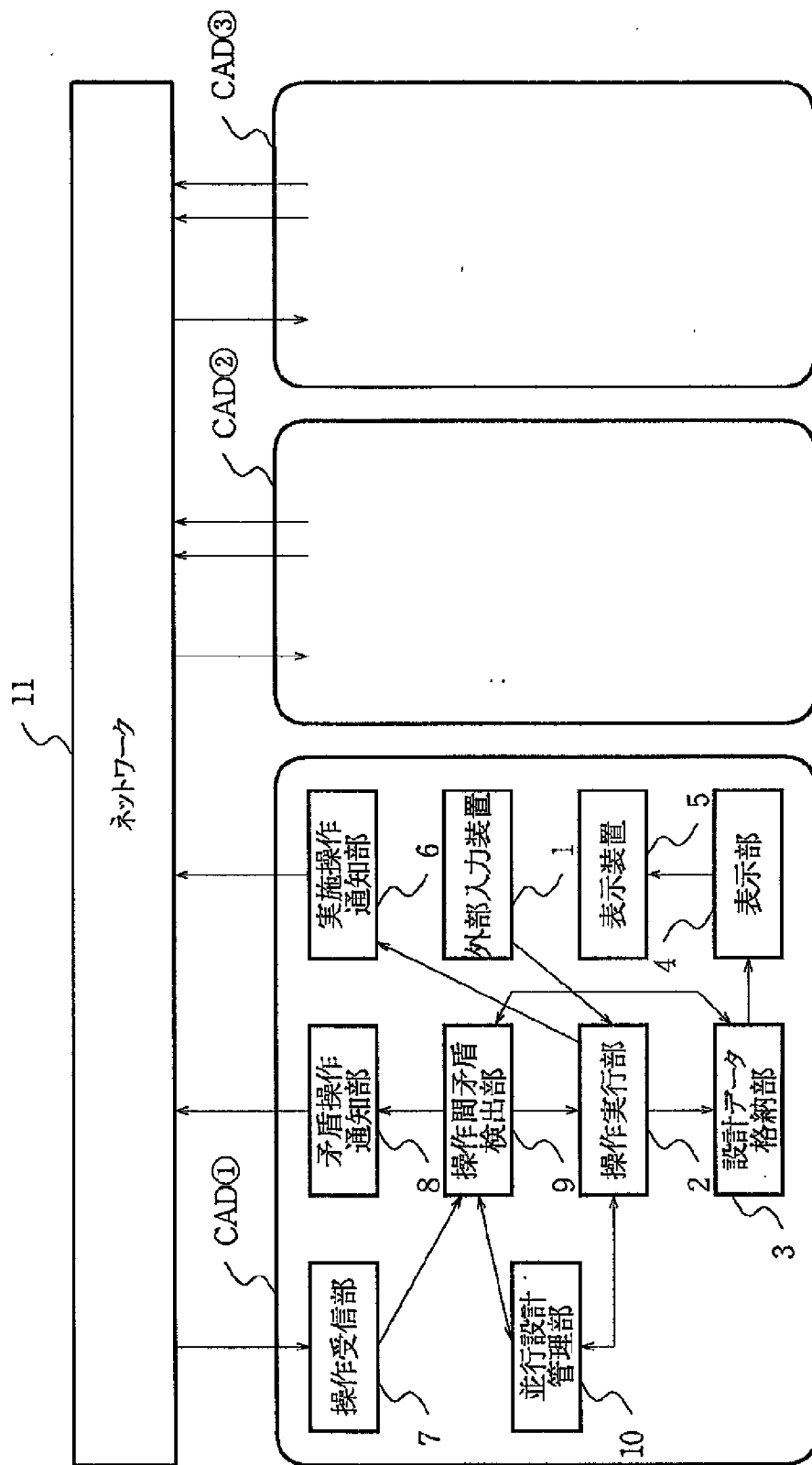
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

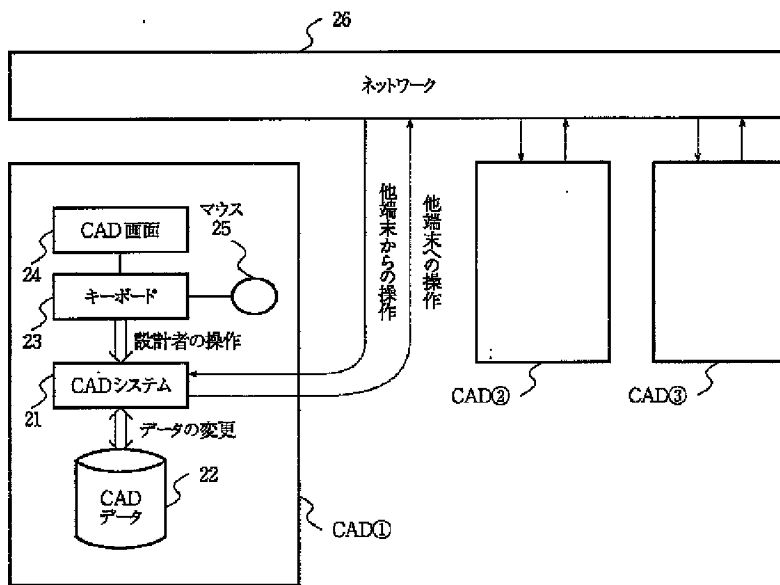
[Drawing 3]



[Drawing 1]



[Drawing 2]



[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, the concurrent-design system of this invention Although it is guaranteed that Parents' CAD design objective is attained by all CAD and each child's CAD design objective may interfere with actuation of Parents CAD since only what all actuation performed by Child CAD has conflict checked by Parents CAD, and does not have conflict is notified to all CAD All design objectives can be attained as a whole by canceling this within each child CAD and attaining a target. Consequently, the need of the concurrent-design system of this invention that each architect takes many targets into consideration simultaneously is lost, and it does so the effectiveness that decline in the design effectiveness by interference between targets and a design mistake can be prevented.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

EXAMPLE

[Example] Next, the example of this invention is explained with reference to a drawing.

[0012] Drawing 1 is the block diagram of one example of the concurrent-design system of this invention.

[0013] In the case of drawing 1, CAD**, CAD**, and CAD** are performing the concurrent design. Although such three CAD is the same configurations, the parents CAD with priority high one set and other CAD are registered as a child CAD with more low priority by setting out of the concurrent-design Management Department 10. However, on level more detailed than this block diagram, each CAD does not need to be the same, for example, CAD of a different kind corresponding to the design field in the actuation activation section etc. may be intermingled.

[0014] External input equipment 1 is an input device which performs CAD design actuation of a mouse, a keyboard, etc. The actuation activation section 2 accesses the design data storage section 3, and reflects design actuation in a design data. When this terminal is Child CAD, Parents CAD are simultaneously asked to the concurrent-design Management Department 10, it lets the advice section 6 of operation actuation, and a network 11 pass, and the design actuation given to Parents CAD is notified. The content of the data storage section 3 is displayed through the display 5 which consists of the display 4 which displays data, the Braun tube, etc.

[0015] The actuation receive section 7 receives the advice from the end of the other end from a network 11, and notifies to the actuation conflict detecting element 9. The actuation conflict detecting element 9 compares the priority in the notifying agency terminal of actuation, and the end of a local with reference to the concurrent-design Management Department 10. Furthermore, the existence of conflict with the data in the end of a local is detected, and it operates as follows according to this.

[0016] If the end of a local is Child CAD and notifying agencies are Parents CAD, actuation in which the actuation activation section 2 was notified to the data of the design data storage section 3 will be performed. If notifying agencies are other children CAD, the content of advice will be disregarded.

[0017] If the end of a local is Parents CAD, the actuation conflict detecting element 9 will detect conflict with a design objective with reference to the design data storage section 3 in the end of a local. Actuation is performed by the actuation activation section 2 if conflict is not detected here. Furthermore, the advice section 6 of operation actuation is notified to other CAD which has not operated the through lever yet. As a result, this actuation is performed by all CAD. When conflict is discovered by the actuation conflict detecting element 9, the child CAD of a notifying agency is notified through the advice section 8 of conflict actuation. This actuation is disregarded and is not reflected in the design data storage section 3.

[0018] The instruction which cancels the actuation to which the carrier beam child's CAD actuation conflict detecting element 9 carried out advice unconditionally from Parents' CAD advice section of conflict actuation is outputted to the actuation activation section 2, and the design data in the design data storage section 3 is returned to the condition before actuation.

[0019] The actuation performed by each CAD is told to other CAD as follows as a result of the upper actuation. As for the actuation performed by Parents CAD, all the children CAD are also performed.

Once the actuation performed by Child CAD is able to investigate the existence of conflict by Parents CAD, the thing without conflict is performed by Parents CAD and all other children CAD. The child CAD who performed is informed of the thing with conflict that this actuation is canceled by Parents CAD, and Child's CAD data are returned to the condition before actuation.

[0020] Next, the example of the more concrete system of the above-mentioned concurrent-design system is explained below.

[0021] Drawing 2 is the system chart showing an example of the concrete configuration of the concurrent-design system of drawing 1.

[0022] This concurrent-design system consists of networks 26 which connect two or more CAD**s, **, ** and ... which consist of CAD system 21, the CAD data 22, a keyboard 23, the CAD screen 24, and a mouse 25, and which became independent, respectively, and CAD** of these plurality, **, ** and ...

[0023] here -- this CAD system 21 -- the actuation activation section 2 of drawing 1, the design data storage section 3, a display 4 and the advice section 6 of operation actuation, the actuation receive section 7, the advice section 8 of conflict actuation, the actuation conflict detecting element 9, and the concurrent-design Management Department 10 -- the CAD data 22 -- the design data storage section 3 -- the CAD screen 24 is equivalent to a display 5, and the network 26 is equivalent to external input equipment 1 for the keyboard 23 in the network 11. And the end of the other end is transmitted to the information to which the advice information by the actuation from the end of the other end was received by CAD system 21 (actuation receive section 7 of drawing 1), and the architect operated the keyboard 23, the mouse 25, etc. as advice information on an actuation sake from CAD system 21 (the advice section 6 of operation actuation of drawing 1, advice section 8 of conflict actuation).

[0024] Thus, a series of actuation explained by above-mentioned drawing 1 by this concrete concurrent-design system is performed.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] First advice means by which the concurrent-design system of this invention notifies the editing operation to the CAD drawing in each of each terminal to other terminals, A receiving means to receive the design actuation notified from other terminals of relevance by the first advice means, A setting-out means to set up priority for every terminal, and a decision means to judge the priority of the design actuation which received with the receiving means and was set up with the setting-out means, Two or more CAD terminals which consist of second advice means to notify to other terminals which are made to reflect the design actuation in the end of the other end in the end of a local according to the priority judged with the decision means, and omit this actuation and which became independent, respectively, It is characterized by consisting of networks which connect between the CAD terminals of these plurality.

[0010] External input equipment 1 for an operator to input design actuation, as for the concurrent-design system of this invention, The actuation activation section 2 which processes a design data according to this actuation, and the design data storage section 3 which memorizes the processed design data, The display 4 and display 5 which display the condition of a design object, and the advice section 6 of operation actuation which notifies outside the design actuation performed in the actuation activation section 2, With the actuation receive section 7 which receives the advice information about the actuation which other CAD which participates in the same design carried out The advice section 8 of conflict actuation which notifies conflict actuation to other terminals, That actuation was disregarded by the advice section 8 of conflict actuation when ignoring the actuation made the actuation activation section 2 perform this, and received when priority was given to the actuation which detected conflict with the design data memorized by the actuation received in the actuation receive section 7, and the design data storage section 3, and was received according to decision of priority The actuation conflict detecting element 9 made to notify outside, Two or more CAD**s, **, **, and ... which consist of the concurrent-design Management Department 10 which judges whether you make which of the advice information received when conflict arose in the actuation conflict detecting element 9, and a current design data give priority, and notifies priority to the actuation conflict detecting element 9 and which became independent, respectively, CAD** of these plurality, **, **, and ... it is characterized by consisting of networks 11 which connect between.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] Although it was common in the drawing editing task in a CAD system to usually have edited one drawing database at one terminal, it has two or more terminals like JP,4-362783,A, and the system which the operator of each terminal can edit simultaneously is also proposed. [0003] Drawing 3 is the block diagram of one example of the system of conventional JP,4-362783,A. [0004] in this drawing, Terminals 31a and 31b are terminals used for the editing operation of a CAD screen etc., and a task manager 32 is ** for managing the CAD drawing edit result in each terminals 31a and 31b. A task manager 32 is formed in the inside of for example, host equipment (not shown). The CAD drawing database (the CAD drawing DB is called hereafter) 33 is for saving a CAD screen (CAD drawing data), and the operating database (Operating DB is called hereafter) 34 is used for CAD drawing edit. The CAD drawing DB33 and operating DB34 are accessed by the task manager 32. The display handlers 35a and 35b manage the display of the CAD drawing to Terminals 31a and 31b etc., the CAD modules 36a and 36b have the CAD drawing edit processing facility realized by the CAD drawing edit application program, and the I/O handlers 37a and 37b form the input/output interface between CAD module 36b in CAD module 36a in a task manager 32 and terminal 31a, and terminal 31b. The I/O handlers 37a and 37b pass the CAD drawing edit result in the end of the other end it is passed from a task manager 32 to the corresponding CAD modules 36a and 36b while telling the CAD drawing edit result in Terminals 31a and 31b to a task manager 32. The display handlers 35a and 35b, the CAD modules 36a and 36b, and the I/O handlers 37a and 37b are built in Terminals 31a and 31b. [0005] According to this approach, the edit result of the same CAD drawing in two or more terminals of each manages, while forming the management tool which updates a drawing database by the edit result in each terminal, the concurrency of the same drawing carries out from two or more terminals at the time of CAD edit, it can operate now by the configuration which established an I/O means notify the edit result in the end of the other end to the terminal which receives and corresponds from this management tool, and compaction of a design construction period can plan. [0006] However, the next technical problem is left behind to this approach.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application] This invention relates to the concurrent-design system which designs the whole in parallel by two or more architects especially about a CAD (computer-aided design) system.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In the conventional system mentioned above, two or more architects may perform editing operation which has conflict mutually -- other architects make the hole for a screw thread in the tooth space to which a certain architect is going to wire -- when a certain architect's edit result designs the failure of a design of other architects, for example, a printed circuit board. Thus, by the conventional approach, since all design terminals are treated to the pair etc., consistent design actuation will be accepted. For this reason, interference starts among architects, another architect destroys a certain architect's design objective, or the effectiveness of an editing task falls as a whole.

[0008] It is possible to set up a rule (for example, for the part which takes charge of a design for every architect to be decided) to which interference does not break out among architects as an approach for preventing this, using the conventional approach. However, with such a rule, the merit of carrying out the concurrent design of the whole design object will be spoiled, and it may not be different from a mere division design.

[Translation done.]